

## **COMPACT SHUFFLE LEG EXERCISER**

### **Reference to Related Applications**

Priority is hereby claimed to U.S. Provisional Application No. 60/178,237, filed  
 5 January 26, 2000. U.S. Provisional Application No. 60/178,237 is incorporated herein  
 by reference.

### **Field of the Invention**

This invention relates to exercising equipment and, more particularly, to compact  
 10 and lightweight apparatuses for the exercise of leg muscles and increase of blood flow in  
 the legs, preferably while seated.

### **Background of the Invention**

Leg exercising equipment typically involves devices that provide for movement  
 15 of the legs while offering resistance to that movement, thereby strengthening the leg  
 muscles. Leg muscles are the largest muscle group in the body and, consequently,  
 exercise of the leg muscles can efficiently raise one's metabolic rate and can improve  
 one's cardiovascular fitness. Traditional leg exercisers are generally large and can  
 require substantial floor space for both use and storage. These leg exercisers are  
 20 typically heavy and difficult to transport. Also, set-up and take-down can be  
 complicated and time consuming.

Other problems of traditional leg exercisers involve the stability of the user while  
 exercising. It is important for a user to maintain his or her balance while exercising, as  
 loss of balance can result in injury to the user. The dangers associated with loss of  
 25 balance may preclude the elderly, or those with either acute or chronic balance  
 problems, from using exercising equipment.

A further area of shortcoming of many conventional leg exercisers involves the  
 inability to achieve a variation in difficulty of the exercise, allowing for a more or less  
 strenuous exercise at the option of the user. Variation of the difficulty of the exercise  
 30 can provide ideally suited exercise for a wide range of users, maximizing benefits to the  
 user and avoiding injury caused by exercise that is too strenuous. Such variation also  
 allows for the elderly or those with weaker muscles to use the same machine as another  
 user with well-developed muscles. Also, during rehabilitation, the difficulty of the

exercise can gradually be increased, thereby minimizing the overall time needed to recover full strength in the muscles.

Another drawback of traditional leg exercisers is that the structure of the conventional exerciser precludes the user from involvement in other activities during exercising. A table, keyboard or other item typically can not be placed such that the user can use it while exercising. Often, the user is in a standing position while exercising. Also, conventional exercisers often require the full attention of the user. As described above, the user needs to hold on to rails or handles to maintain their balance.

## 10 Summary of the Invention

The present invention overcomes the problems of the prior art described above by providing a compact and lightweight apparatus for the exercise or movement of leg muscles that is suitable for use from a seated position. The shuffle leg exerciser is compact and can be used, for example, while the user is seated in an airline seat or at a desk or table. The exerciser occupies minimal floor space both during use and during storage and can optionally be integrated into public transportation seating or other seating. Because the user can be seated during exercising, the leg exerciser of the present invention is very stable, minimizing the risk of the user falling and other injury from loss of balance. Furthermore, because of the optional seated operating position and ease of use, the user is able to perform other activities while exercising.

One embodiment of the invention involves a hinged exerciser for minimal storage size and ease of transport. The set-up and take-down process for the present invention is very straightforward. Set-up involves merely placing the exerciser on a reasonably flat surface and placing the user's foot on a foot pad.

The exerciser of the present invention involves a base member having at least one longitudinally extending first track. A foot pad is provided to receive a user's foot and slide within the track in the base member. A plurality of gliders is coupled to the bottom of the foot pad, to permit the foot pad to smoothly and quietly slide within the track in the base member in a linear path generally free of lateral motion.

In accordance with an alternative embodiment of the invention, a second track, parallel to the first track, is provided. A second foot pad is also provided with a plurality of gliders for proper sliding of the foot pad within the track.

In accordance with another aspect of the invention, the plurality of gliders are symmetrically disposed about the bottom surface of the first foot pad.

In accordance with another aspect of the invention, the leg exerciser is configured for operation from a seated position. The size and shape of one embodiment  
5 of the invention is configured to fit between the legs of standard five-leg office chairs.

In accordance with a further aspect of the invention, means for providing resistance to the motion of the foot pad within the first track can be provided.

Ease of use is afforded by the present invention. Operation of the leg exerciser involves oscillating movement of the foot pad within a track of the shuffle leg exerciser.

10 One embodiment of the present invention provides for varying the difficulty level of the exercise activity by providing an inclined surface on the leg exerciser for travel of the foot pad. Another embodiment of the invention involves the use of a spring or elastic band system providing additional variation in exercise difficulty.

15 It is an object of the invention to provide a compact, lightweight and quiet leg exerciser, operational under a table, desk or chair and easily transported or mounted to a chair.

It is an object of the invention to provide a leg exerciser for use by those of age 3 to over 100, including those undergoing physical therapy or rehabilitation of leg muscles.

20 It is an object of the invention to provide a leg exerciser that may be used by someone with only one leg, having impaired muscle or joint function, or someone unable to stand while exercising.

A further embodiment of the invention involves a leg exerciser having a first foot pad configured to receive a user's foot and a base member adapted to be rotatably and  
25 slidably mounted to a first chair and having at least one longitudinally extending first track formed thereon, the first track being sized and shaped to permit the first foot pad to travel therein, wherein the base member is adapted to be rotated to a position enabling use of the leg exerciser by a seated operator.

### 30 **Brief Description of Drawings**

These and other features and advantages of the present invention will be more fully understood by reference to the following detailed description in conjunction with

the attached drawings in which like reference numerals refer to like elements through the different views. The drawings illustrate principles of the invention.

FIG. 1 is a top view of a leg exerciser according to the teachings of the present invention;

5        FIG. 2 is a side view of a variation of an embodiment of the present invention;

FIG. 3 is a top view of the variation of an embodiment of the present invention involving a texturized foot pad;

FIG. 4 is a bottom view of the leg exerciser of FIG. 1;

FIG. 5 is an end view of the base of a leg exerciser of the invention without  
10    showing the foot pads;

FIG. 6 is a bottom view of a foot pad of the leg exerciser of FIG. 1, according to the teachings of the present invention;

FIG. 7 is an end view of a foot pad according to an embodiment of the present invention;

15        FIG. 8 is a top view of a foot pad according to an embodiment of the present invention;

FIG. 9 is a side view of a foot pad according to an embodiment of the present invention shown in FIG. 8;

FIG. 10 is a top view of a foot pad according to an embodiment of the present  
20    invention;

FIG. 11 is a side view of a foot pad according to an embodiment of the present invention;

FIG. 12 is a cross-sectional view of the base of a leg exerciser of an embodiment of the invention;

25        FIG. 13 is a side view of the invention showing the incline stand;

FIG. 14 is a top view of an embodiment of the invention including an elastic strap, shown on one side;

FIG. 15 is a top view of an embodiment of the invention including two pulley systems to provide passive range of motion;

30        FIGS. 16 and 17 are views of a side mount configuration according to an embodiment of the invention; and

FIGS. 18, 19 and 20 are views of a swing mount configuration according to an embodiment of the invention.

### **Detailed Description of the Preferred Embodiments**

The present invention, in various embodiments, is able to provide for exercise of a user's leg muscles while the user is seated. As used herein, "exercise" includes  
 5 muscular movement sufficient to raise one's metabolic rate and also muscular movement insufficient to raise one's metabolic rate.

Deep vein thrombosis, causing blood clots, can be triggered by long periods of inactivity while seated. Long trips while seated as a passenger in a private vehicle or any form of public transportation, such as airplane, train, bus, car or boat, can result in  
 10 deep vein thrombosis. Various embodiments of the present invention is particularly well suited to inhibiting deep vein thrombosis by enabling movement of the leg muscles. Such movement of the leg muscles can increase blood flow and inhibit the formation of blood clots, even without raising one's metabolic rate.

The present invention, in various embodiments, is also particularly well suited to  
 15 the movement of the leg muscles while offering resistance to that movement, thereby strengthening the leg muscles. Such exercise of the leg muscles can efficiently raise one's metabolic rate and can improve one's cardiovascular fitness. Such exercise can be performed in a wide variety of settings including the home and office, as well as outdoor locations and during travel. By way of example, numerous applications of the  
 20 exercising equipment according to embodiments of the present invention are available, such as use while seated during long public transportation journeys, such as trans-continental airline flights or use in a living room or while sitting at a desk in an office.

A leg exerciser 10 according to the teachings of an embodiment of the present invention is illustrated in Figure 1. The shuffle leg exerciser 10 includes a base 12 upon  
 25 which two tracks 20 are formed; each track 20 being sized and shaped to receive a foot pad 40 therein. The two tracks 20 permit simultaneous exercise of two legs. Optionally, only one track may be provided for the exercise of only a single leg. The tracks 20 are formed by track edges 22, track ends 24 and a track divider 28, which is provided to inhibit contact between the two foot pads 40 during use.

30 A hinge 30 is optionally located along the track divider 28 so as to provide the ability to fold the shuffle leg exerciser 10 lengthwise. The compact shuffle leg exerciser 10 can fold about hinge 30 for convenient transport or storage. The foot pads 40 can be removed from tracks 20 prior to folding of the hinge 30. One or more smaller hinges

may be used in place of a single hinge to reduce weight. Foot pads 40 may optionally be left in tracks 20 for convenient storage, such that they do not interfere with each other when the hinge 30 is folded.

Optionally, a transverse hinge 31 may be provided instead of hinge 30, as shown in Figures 2 and 3. The transverse hinge 31 is preferably provided on the bottom of base 12 and allows the shuffle leg exerciser 10 to be shortened and more easily transported. The transverse hinge 31 may also be optionally made of one or more smaller hinges. Preferably, a lap joint 29 is provided in combination with the transverse hinge 31, to absorb some of the forces applied to the track 20 by the foot pads 40 during operation of the shuffle leg exerciser 10. The lap joint 29 also provides an advantage in maintaining a substantially uniform track 20 surface level by the interaction of the portions of the track 20 at the lap joint 29. Alternatively, a flush joint may be used in place of the lap joint 29.

Optionally, sliding bolts or other bracing mechanisms could be used to enhance structural rigidity of the base 12. Preferably, such sliding bolts or other bracing mechanisms would be used in configurations involving a hinge 30 or transverse hinge 31.

Referring to Figure 4, bottom feet 62 can be provided on the bottom surface of the base 12 to prevent movement of the shuffle leg exerciser 10 during operation. The bottom feet 62 are positioned on the bottom surface to evenly distribute the weight of the leg exerciser 10 and increase the stability of the base 10, particularly during use. For example, the bottom feet 62 can be positioned at each of the corners of the base 12, as illustrated in Figure 4. One skilled in the art will recognize that the number and location of the bottom feet 62 are not limited to that which is shown in Figure 4. Additional bottom feet can be provided to further increase the stability of the base and minimize the motion of the base 12 during operation. Bottom feet 62 can be replaced with other items, such as long strips, that will inhibit movement of the base member along the surface on which it is placed. The bottom feet 62 are preferably made of a material having an increased coefficient of friction, such as for example rubber, to further minimize motion of base 12. The bottom feet 62 are not limited to a circular shape and may be formed in a wide variety of shapes, such as for example, square and rectangular.

As shown in Figure 5, additional bottom feet 62 may be mounted near the hinge 30, or the transverse hinge 31, so as to assist in preventing the center of the shuffle leg

exerciser 10 from sagging below the level of the outside edges. The additional bottom feet 62 may not be needed when the bottom feet 62 mounted on the outside corners of the exerciser are low and do not substantially raise the height of the outside edges of the exerciser.

- 5           The base 12 may be formed of wood, plastic, metal, or other material that is durable and sturdy to minimize flexing when in use. Preferably, the base 12 will be made of a material that is also lightweight. Track edges 22 are also formed of wood, plastic, metal or other material that is preferably lightweight, durable and sturdy to avoid flexing when in use. By way of example track edges 22 may be formed of aluminum.
- 10       Track ends 24 are formed of durable material with emphasis on impact resistance. In one embodiment, the track 20 is formed of a metal. In one embodiment, the track edges 22 and track ends 24 are ideally formed of aluminum.

- 15           Figure 5 illustrates an end view of the shuffle leg exerciser 10 without the foot pads 40. Figure 5 illustrates an optional outward placement of bottom feet 62 from that shown in Figure 4. With reference to Figure 4, although a wide variety of sizes are within the scope of the invention, ideally the track 20 will be approximately  $\frac{1}{2}$  inch deep. The shuffle leg exerciser 10 may be made of a wide variety of materials or combination of such materials and a wide variety of sizes are within the scope of the invention. For example, if the floor 32 of track 20 is made of plywood, the plywood
- 20       may be  $\frac{1}{4}$  inch thick. A support member 34 may be provided under the floor 32, also optionally made of  $\frac{1}{4}$  inch thick plywood.

- 25           Optionally, track end bumpers 26 may be fitted at the track ends 24. Track end bumpers 26 may be formed of plastic, wood, rubber, or other shock absorbing material. The track end bumpers 26 cushion the impact of the foot pad 40 when it reaches the end of the track 20. The track end bumpers 26 provide for smoother and quieter operation of the foot pad 40 when the foot pad 40 travels to an end of the track 20.

- 30           The base 12 may preferably be sized in width to fit between the wheels of a five-wheel office chair. Such a width would then easily allow the shuffle leg exerciser 10 to fit between the legs of a standard, stationary, four-leg chair. By allowing part of the shuffle leg exerciser to be located under a chair, the path of travel of the user's feet while exercising can be natural and convenient. The base 12 may be sized in length to provide a desired amount of foot pad travel. 22 to 30 inches of length is typically adequate, although shorter lengths may be sufficient for increasing blood flow in small

spaces, such as in an airline seating environment. 28 to 30 inches is a preferred length for home or office use. Foot pads 40 may be sized to accommodate a user's feet.

Preferably, foot pads 40 will be longer than a user's feet to avoid the ends of a user's feet from approaching the ends of the foot pad 40 and be in danger of colliding with a track end bumper 26 or track end 24. Various sizes of foot pads are contemplated within the scope of the invention. Although various dimensions described herein have been found to be advantageous in various applications, the present invention is not limited to specific dimensions.

An optional frame can be attached to base 12 to provide support to the user when using the shuffle leg exerciser 10 while standing. Various frame configurations allow the user to hold on to the shuffle leg exerciser 10 in order to stabilize a user before, during and after operation of the shuffle leg exerciser 10.

The foot pad 40 can be formed of a durable and lightweight material such as wood, plastic or metal. The foot pad 40 may be formed in a wide variety of shapes, such as rounded ends or ergonomically formed top surfaces to better conform to a user's foot in the event the user is not wearing footwear. The foot pad 40 is provided with means for attaching the foot pad to the user's foot as shown in Figures 1 and 5. In one embodiment shown in Figure 1, the means for attaching is a toe cup 42 provided proximate one end of the foot pad 40 and a heel cup 44 provided proximate the opposite end of the foot pad 40. Both the toe cup 42 and heel cup 44 are centered along the width of foot pad 40. The distance between the toe cup 42 and heel cup 44 preferably can be adjusted to accommodate different sizes of feet/shoes.

An ankle strap 46 can optionally be provided for mounting over the user's foot, thereby holding the heel of the user's foot securely in the heel cup. The ankle strap 46 may be provided with a hook and loop fastener, such as VELCRO™, or may be formed so that it can be tied or latched with a buckle or other form of attachment clasp so as to form a snug fit on a user's foot.

Alternatively, a toe strap and heel strap may be provided in place of the toe cup 42 and heel cup 44, respectively. The toe strap and/or heel strap may be provided with a hook and loop fastener or may be formed so that it can be tied or latched with a buckle or other form of attachment clasp so as to form a snug fit on a user's foot. Also, a toe cup may be used in conjunction with a heel strap, and a toe strap may be used with a heel cup.



In a variation of the invention, a texturized foot pad 41 is provided with a texturized surface 50 along at least a portion of the foot pad 41 adapted to contact a user's foot, see Figure 3. For example, the portion of the foot pad 41 contacting the user's heel and the portion of the foot pad 41 contacting the ball of the user's foot may  
 5 be provided with a texturized surface 50. The texturized surface is intended to inhibit the user's foot from sliding relative to the texturized foot pad 41.

The texturized surface may be provided by the use of an adhesive affixed to the foot pad 41, such as adhesive sandpaper, or may be formed by processing a portion of the surface of the foot pad 41 to create a texturized surface, such as by grinding or  
 10 painting, for example. The texturized foot pad 41 may be used with the shuffle leg exerciser 10 in combination with a foot pad 40, or two texturized foot pads 41 may be used. Furthermore, features and variations of the foot pad 40 described herein may be combined with the texturized surface of the texturized foot pad 41, and the texturized foot pad 41 may be substituted for the foot pad 40 in any embodiment or variation of the  
 15 invention. By way of example, the texturized foot pad 41 may be provided with a heel strap 44 or a toe strap 42 or the foot pad 40 may be provided with one or more texturized surfaces.

Figure 6 illustrates the bottom of the foot pad 40. Four gliders 48 are shown mounted to the bottom of foot pad 40 so as to provide for smooth sliding between foot  
 20 pad 40 and track 20. An end view of the foot pad 40 is provided in Figure 7. The glider 48 is preferably formed of a hard plastic so as to provide quiet operation and long-term use with minimal wear. The gliders 48 may be formed of other materials, or a combination of materials, that allow for smooth sliding between track 20 and foot pad 40, such as metal, wood, felt and a variety of plastics. It is important to take the  
 25 selection of track material into account in selecting the glider material to minimize noise and wear of both surfaces and avoid the generation of residue or marking of either surface during operation.

The glider 48 may be designed to provide minimal wear of the track surface by providing rounded edges on the bottom of the glider 48. Ideally, the glider will be  
 30 attached to the foot pad 40 by a manner in which the user can replace them when they are worn. Screws are one means of attachment. An adhesive or other conventional attachment means can also be used. Channels may also be transversally mounted on the bottom of the foot pads 40 to hold the ends of the glider 48 and absorb the principal

forces acting on the foot pads 40. Small tabs can then be formed to laterally hold the glider 48 within the channels.

Optionally, material capable of inhibiting noise during friction may be mounted along the sides of the foot pad 40, or along the track edges 22, between the foot pad 40 and track edges 22. Although a wide variety of materials are available, materials such as felt, cloth or plastic may be used.

In a variation of the invention, the foot pad 40 may be provided with an adjustable resistance device 70 as shown in Figures 8 and 9. The adjustable resistance device 70 applies an outward force against the track edge 22. Preferably, an outward force is applied to both track edges 22 of the track 20. In the illustrated embodiment, an adjustable resistance device 70 is provided with a turnbuckle 72 in communication with one or more adjustment rods 74. The turnbuckle 72 may be mounted within a cavity formed within the foot pad 40 and be accessible from only the top or bottom of the foot pad 40. Alternatively, the turnbuckle 72 may be mounted within a hole formed in the foot pad 40, allowing the turnbuckle 72 to be accessed from both the top and bottom of the foot pad 40.

The turnbuckle 72, which may be in the shape of a dial, is mounted so as to move the adjustment rod 74 outwardly toward a side of the foot pad 40 or inwardly away from the side of the foot pad 40, depending on the rotation of the turnbuckle. If two adjustment rods 74 are provided, the adjustment rods preferably both move outwardly or inwardly simultaneously. Preferably, a friction pad 76 is provided at an end of the adjustment rod 74 opposite the turnbuckle 72 and adapted to be pushed against the track edge 22. The friction pad 76 may be rectangular as shown in Figures 8 and 9, or may be round, oval or another shape. The friction pad 76 may be provided with felt or cloth or other material to preferably inhibit noise during operation of the shuffle leg exerciser 10. The friction pad 76 may be formed of a combination of a firm backing material, such as metal or plastic, with an outer covering of a material, such as for example, felt or cloth, preferably capable of inhibiting noise during frictional movement of the friction pad 76 along the track edge 22.

In a further variation of the invention, one or more rollers 78 may be provided along a bottom of the foot pad 40, as shown in Figure 10. The rollers 78 are aligned to have an axis of rotation substantially perpendicular to the direction of travel of the foot pad 40 during travel within the track 20. The roller 78 may be mounted to the foot pad

40 by the use of a wide variety of methods, such as by the use of a bracket and a center pin along the axis of rotation of the roller 78. Alternatively, the roller 78 may be located within a cavity 77 formed within the bottom of the foot pad 40, as shown in Figure 11, allowing the roller 78 to rotate within the cavity 77.

5            Optionally, roller retainers 79 may be provided to assist in retaining the roller 78 within the cavity 77. Preferably, the roller retainers 79 do not contact the track 20. Rollers 78 are well suited for use with the adjustable resistance device 70, allowing increased resistance to movement of the foot pads 40 within the tracks 20 than may be available if rollers are used. However, an adjustable resistance device 70 is not required  
10           to be provided with an embodiment of the invention incorporating rollers 78. Rollers 78 may be formed of a wide variety of materials, including those materials used for gliders 48 and other, higher friction materials. Gliders 48 may be used in combination with one or more rollers 78.

             The overall width of the foot pad 40 should provide for travel in a linear path  
15           within track 20, generally free of lateral motion. Optionally, this can be accomplished by the use of a slightly narrower main portion of foot pad 40 and gliders 48 mounted so that the outside edges of the gliders 48 extend beyond the side of the foot pad 40. Such a configuration provides for the gliders 48 to be in contact with the track edge 22, while inhibiting contact with the track edge 22 by other portions of the foot pad 40. Such a  
20           configuration reduces friction and noise by reducing the surface area of the foot pad 40 with the track edges 40. Another benefit involves the reduced wear to the side of the foot pad 40, focusing any wear on the wear-resistant gliders 48 that may be periodically replaced.

             Optionally, as shown in Figure 12, a groove 23 may be formed in the track edge  
25           22. The foot pad 40 may be provided with a flange 43 for travel within the groove 23. Preferably, each track edge 22 is provided with a groove 23 and each side of the foot pad 4 is provided with a flange 43. Such a configuration inhibits removal of the foot pad 40 from the track 20 and increases control of the travel of the foot pad 40 by keeping the foot pad proximate to the track 20. The ability to retain the foot pad 40  
30           within the track 20 is particularly desirable when the shuffle leg exerciser 10 is available for public use, such as by a portable rental unit or by mounting within seating available to multiple users. Therefore, rollers 78 may be more easily be retained within cavities 77. The use of an adjustable resistance device is also provided by an embodiment of the

invention by allowing portions of the flange 43 to be forced against the groove 23, for example, movable in combination with the adjustment rod 74. Alternately, other portions of the side of the foot pad 40 may be movable in combination with the adjustment rod 74.

5           According to a variation of the invention, gliders 48 may be mounted to the bottom of the foot pad 40 such that they can be moved away from the foot pad 40. By way of example, gliders 48 could be mounted on a bolt that could be turned to move the glider 48 downward. In such a configuration, with the use of the flange 23 and the groove 43, resistance to movement of the foot pad 40 may be adjusted by increasing or  
10       decreasing the pressure applied to the track 20 by the glider 48.

Material selections may be chosen based on the application in which the leg exerciser 10 will be used. For example, a low cost variation may be formed primarily of wood with plastic gliders 48. Such a variation may not provide light weight or the most quiet operation, but will be suitable for many applications. Conversely, a travel model  
15       may preferably be formed of a lightweight metal or lightweight plastic and with a hinge 30 to provide compact storage and transport while remaining lightweight. Such a configuration may also be desirable for use with an embodiment of the invention adapted for integration within the seating of a public transportation environment. In such an application, non-flammability may also be desirable. Therefore, wood may not  
20       be desirable for use in embodiments of the present invention for use in public transportation seating.

Hook and loop fastener straps 92, shown in Figure 4, are configured to mate with hook and loop fastener pads 94 to keep the compact shuffle leg exerciser 10 in a closed position. Handle 90 provides for easy handling during transport. Also, lifting strap 91,  
25       shown in Figure 2, may optionally be provided to aid in lifting the shuffle leg exerciser 10 up from the floor while simultaneously allowing the shuffle leg exerciser 10 to begin folding if equipped with the transverse hinge 31. Preferably, the lifting strap 91 is sized to allow the shuffle leg exerciser 10 to fold completely about the transverse hinge 31, if so equipped.

30           According to a further variation of the invention, an elevated guard 190 is optionally provided to preclude the shuffle leg exerciser 10 from sliding under a luggage retention bar of an airline seat. The elevated guard 190 would therefore allow the shuffle leg exerciser 10 to be stored under an airline seat, but would not allow the

shuffle leg exerciser 10 to slide past the seat under which it is stored and injure passengers forward in the aircraft from where the shuffle leg exerciser 10 is stored. The elevated guard 190 may optionally be movable for ease of transport. For example, the elevated guard 190 may optionally swing forward and down along an end of base 12.

5           The use of shuffle leg exerciser 10 from a seated position will now be described. The shuffle leg exerciser 10 is located on the floor and oriented longitudinally away from the user. The user is seated in a chair located at a longitudinal end of the shuffle leg exerciser 10 such that the chair and the user are facing the shuffle leg exerciser 10. The user then secures one of her feet in each of the foot pads 40 by locating her foot in  
10   the toe cup 42, or under the alternative toe strap, and within the heel cup 44 and securing the ankle strap 46 over the top of her foot. Alternatively or in addition, a user may place her foot on a texturized surface on the foot pad 40. It is understood that the use of  
15   “foot” in this description will typically mean the user’s foot within a shoe. Upon securing both feet, the user then moves her feet fore and aft so as to move the foot pad 40 within the track 20 of the shuffle leg exerciser 10. The present invention can be operated while the user is seated at a desk, table, or public transportation seating, thereby making it convenient for use whenever one is seated.

          Another embodiment of the invention involves a shuffle leg exerciser 200 equipped with an incline stand 60, as shown in Figure 13. The structure of the compact  
20   shuffle leg exerciser 200 is similar to the compact shuffle leg exerciser 10 of the first embodiment. The incline stand 60 of the compact shuffle leg exerciser 200 can be set to elevate the distant end of the compact shuffle leg exerciser 200 so as to provide increased resistance or for more convenient orientation with the travel of the user’s feet while seated. The incline stand 60 can be set to a variety of heights depending on the  
25   user’s preference. As with the shuffle leg exerciser 10 of the first embodiment, a hinge 30 or transverse hinge 31 may optionally be provided.

          Another embodiment of the invention is shown in Figure 14. The shuffle leg exerciser 300 shown in Figure 14 is similar to the shuffle leg exerciser 10 shown in Figure 1, except that elastic straps 80 are attached to the foot pad 40 to increase the  
30   resistance of the foot pad 40 to motion within the track 20. Although Figure 14 shows elastic straps 80 attached to only the left foot pad 40, elastic straps 80 can be attached to both foot pads 40 or only the right foot pad 40. Also, an elastic strap 80 may only be attached to one end of a foot pad 40, thereby providing resistance to travel in one

direction. This may be particularly useful for muscle rehabilitation purposes. In the operation of shuffle leg exerciser 300, the user secures each of her feet to a foot pad 40 located within track 20 of the shuffle leg exerciser. A spring or alternative mechanisms for providing resistance may be used in place of the elastic strap 80.

5           As an option to any of the above embodiments, the shuffle leg exerciser may be formed with only a single track. This provides a benefit in reduced size and weight and is also ideal for muscle rehabilitation of only one leg.

          A further embodiment 400 of this invention is shown in Figure 15. It is similar to the shuffle leg exerciser shown in Figure 1, except that both foot pads 40 are attached  
10 by a cable 130 to each other through a pulley system 140 located at an end of the base 12. The configuration of the cable 130 and pulley system 140 allows movement of one foot pad 40 along track 20 to move the other foot pad 40 in neighboring track 20. Preferably, a pulley system 140 is located at each end of the base 12. The cable 130 is preferably mounted so as to provide simultaneously opposite directions of motion  
15 between neighboring foot pads 40. Alternatively, the cable 130 may be mounted to provide the same simultaneous directions of motion of neighboring foot pads 40. A rope, strap, belt or similar device may be used in place of the cable 130.

          This type of "passive range of motion" is especially useful for rehabilitation and physical therapy situations in which one leg is unable to move on its own power. It is  
20 equally useful for chronic and acute injury, weakness, or trauma to the legs. Examples of these situations include people who have a fully or partially paralyzed leg, for example, following a stroke; people who have recently undergone surgery on one leg, especially on the knee joint; elderly or other individuals who may have greatly reduced strength in one leg; and people who have damaged muscles or joints in one leg that  
25 prevents them from achieving either the forward pushing or backward pulling motion with that leg. The adjustable resistance device 70, described herein, may also be used to provide passive range of motion. It is preferable to use at least one of the toe strap 42, heel strap 44 or ankle strap 46 in combination with a passive range of motion configuration or with users having limited control of foot motion to better secure the  
30 user's foot to the foot pad 40. Also, the use of a flange 23 and groove 43 is preferred in such situations to better ensure the foot pad 40 remains within the track 20.

          According to further embodiments of the invention, the shuffle leg exerciser 10 of the present invention may be mounted to seating, such as seating in a public

transportation environment, or in other seating, such as, for example, in a nursing home setting. The shuffle leg exerciser 10 may also be used in a school setting. The shuffle leg exerciser 10 of the present invention could allow children to release excess energy and concentrate. This may be particularly helpful with hyperactive children.

5           A side mount configuration 800 is shown in Figures 16 and 17 in which a shuffle leg exerciser 10 is pivotably, and optionally slidably, mounted to either a floor 1000 or a seat 1010 by the use of a pivot pin 810 located within a pivot housing 820. By mounting the shuffle leg exerciser 10 to the floor 1000, vibration caused by the movement of the foot pads 40 within the track 20 is inhibited from transmission to the  
10   seat 1010. Also, the unit may be tethered to the floor 1000 by the use of a cable, thereby further limiting transmission of vibration while preventing the swing mount configuration 900 from being removed from the area near the seat 1010. Optionally, a locking pin 820 may be provided to secure the shuffle leg exerciser 10 in a stored position as shown. Before use, the shuffle leg exerciser 10 is rotated to be parallel to the  
15   floor 1000. Optionally, the shuffle leg exerciser 10 may also be slid into position for use. The seat 1010 may be the seat in which a user of the shuffle leg exerciser 10 is sitting, or may be the seat ahead of the user.

          Another embodiment of the invention adapted for mounting within seating is shown in Figures 18-20. A swing mount configuration 900 is shown with a chair 1010.  
20   A locking handle 910 is provided to secure the shuffle leg exerciser 10 of the swing mount configuration 900 to the chair 1010 and/or a mounting groove 930. The swing mount configuration 900 provides a shuffle leg exerciser 10 with swing pins 920, shown in Figure 19, adapted to be mounted within the mounting groove 930, shown in Figure 20. The mounting groove 930 is preferably secured to the chair 1010 and provides a  
25   path for the swing pins to travel. Preferably, the swing pins 920 are formed so that they do not fall out of the mounting groove 930, thereby keeping the shuffle leg exerciser 10 aligned with the chair 1010 and mounting groove 930. The swing mount configuration 900 may be mounted to the user's chair or a chair in front of the user.

          In use, the locking handle 910 is released and the shuffle leg exerciser 10 moves  
30   so that the swing pins 920 travel within the mounting groove 930 and allow the shuffle leg exerciser 10 to be positioned for use. The shape of the mounting groove 930 shown in Figures 18 and 20 is for illustrative purposes only. The mounting groove 930 may not travel along the legs of the chair 1010. The mounting groove 930 functions to locate the

shuffle leg exerciser 10 in a position out of the way when not in use and allow the shuffle leg exerciser 10 to conveniently be positioned for use as desired.

In addition to the above-described examples, further configurations involving mounting of the shuffle leg exerciser 10 to seating are within the scope of the invention.

- 5 For example, the shuffle leg exerciser 10 may be stored within an arm rest of a seat and rotated and unfolded, much as trays are provided in airline seats unable to use a tray from a seat directly ahead.

- The features of the above-described embodiments and variations of the invention may be combined in many ways. For example, elastic straps 80 may be used on an  
10 inclined shuffle leg exerciser 200. Another example of feature combination involves track end bumpers 26 that may be used with any embodiment. The use of the flange 23 and groove 43 may be used with any variation or embodiment of the invention. There are many combinations not listed here.

- The present invention has been described by way of example, and modifications  
15 and variations of the exemplary embodiments will suggest themselves to skilled artisans in this field without departing from the spirit of the invention. The preferred embodiments are merely illustrative and should not be considered restrictive in any way. The scope of the invention is to be measured by the appended claims, rather than the preceding description, and all variations and equivalents which fall within the range of  
20 the claims are intended to be embraced therein.